

# PATENT SPECIFICATION



Application Date: Nov. 22, 1938. No. 33972/38.

521,571

Complete Specification Accepted: May 24, 1940.

## COMPLETE SPECIFICATION

### Improvements in Coloured Concrete Building Structures

We, PAUL ANFT, a German citizen, of 27, Wilhelmshöherstrasse, Berlin-Friedenau, Germany and WERNER HASSENSTEIN, a German citizen, of 8, Giesebrechtstrasse, Berlin-Charlottenburg 4, Germany, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

It is often desirable to render concrete structures coloured and it has already been proposed to provide structures made of ordinary grey concrete with a coating of coloured concrete mass for this purpose. However, this method has various defects, firstly, it involves a not inconsiderable increase in the building expenses, because the concrete for the coating must be made and applied separately, whereby the drying period is also extended, secondly, if the comparatively thin coating is damaged the underlying grey concrete becomes visible, whereby the structure becomes unsightly.

According to the invention these defects are eliminated for the purpose of camouflaging outer walls, roofs, roads and the like by constructing the same as concrete masses having a variegated appearance produced by filling the shuttering or other mould with separate batches of differently coloured concrete cast together to form an integral mass with variegations extending throughout its entire thickness. Since the costs of colouring the mass of concrete are very slight and as coloured concrete need not even be dearer than the uncoloured one if suitable production methods are adopted, the additional cost of preparing coloured concrete by coating are saved altogether or at least to a great extent, and moreover, damage to the outer layers of concrete does not affect the appearance of the structure, since the inner mass then appearing also has a variegated appearance, so that the damage is invisible from a certain distance.

The invention has a particular significance in the erection of military fortifications, dug-outs, bunkers, starting runs for military airfields or the like. Experience

in warfare has shown that concrete or reinforced concrete are the only materials which can be used successfully for building fortifications, as these are the materials which afford the greatest possible safety against artillery attacks and bombs from the air. Hitherto, such structures were built exclusively of normal white or grey concrete or reinforced concrete. But this has the defect that if by an accidental hit the enemy artillery has succeeded in removing even in part the camouflage of the structure, consisting of piled up earth, coat of paint or netting, the edges of the shell hole appearing in light colour and the whitish-grey concrete dust strewn therearound provide a clearly recognisable target for the enemy artillery observer, the previously carefully camouflaged dug-out or the like being now exposed as a definite target for the enemy artillery.

The invention completely eliminates this defect by employing for such structures a concrete mass coloured throughout with camouflage colouring in the manner specified which is difficult to recognise from a distance or is matched to the colouring of the surroundings of the structure. With the invention, it is not a surface layer of the structure, coated with a coloured layer of a few millimetre thickness, as hitherto proposed, which is presented to damage by war missiles, but the concrete as such is coloured throughout, and it is only this that offers the result that the place of a hit remains unrecognisable for an enemy observer.

A further very suitable application of the invention is in connection with the concrete surfacing of roads, particularly motor roads. If these roads, which represent the shortest connection between all larger towns are made in the usual manner of white or grey concrete, they form the best possible route indication for enemy aircraft, visible even from a great height and also at night. If, in contrast, a coloured concrete mass according to the invention, matching the surroundings of the road and effected in alternate colouring after the manner of camouflage painting is employed, then the

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road is no longer visible even from a comparatively low altitude and thus cannot be utilised by enemy aircraft as a route indication.

5 It has already been proposed to make the surfacing of concrete roads from single stock of concrete of one colour (e.g. red, green, yellow or black), but in contrast to the invention this colouring may serve to  
10 make the roads more conspicuous; moreover in this case only surface colouring is employed as a coating with the defects already indicated.

15 Fundamentally, the concrete mass to be utilised according to the invention has the usual composition of concrete, i.e. it consists of a mixture of the known filling substances, sand, gravel, or stone chippings, with cement as binding agent.

20 The mass may be coloured by colouring the various batches of the binding agent (e.g. cement) prior to use, i.e. prior to the mixing of the concrete, for example in mixing machines, in the desired camouflage colours with the aid of mineral and  
25 earth colours, e.g. English red, ultramarine, ochre or the like. The cement so coloured is bagged in readiness for addition to the concrete mass in a mixing  
30 machine according to the desired colouring.

It is also possible, however, to add the colours on site, i.e. to introduce the cement or other binding agent with the  
35 filling substances and the rest of the agglomerate into the mixing machine and to add the colouring agent at the same time.

40 A particularly cheap and therefore convenient method of camouflage colouring consists in adding coloured stone powder to the concrete mass.

In order to lend the highest possible degree of elasticity to the concrete, it is  
45 convenient to add to the filling substances brick powder, which may be produced by grinding brick chippings, and/or fibrous substances, which are coloured with tar or mineral colours for obtaining the colour effect.  
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Further at the final mixing either of the coloured binding agent with the filling substances or of the uncoloured binding agent with the filling substances and the  
55 colours, in place of clear water for the mixing of the concrete, there may be used water which has added thereto a small amount of a bituminous emulsion, such as densin, cerin oil or ceresit, in a proportion  
60 of about 1 to 20 to 1 to 30. This considerably increases the waterproofness of the concrete. Further it is advantage to add to the water a certain quantity of alum or an equivalent substance which is  
65 capable of swelling the fibrous substances

added to the mass, and permanganate of potassium, the latter also for colouring the mass. The water thus prepared is mixed with the concrete mass in known  
70 manner, said mass having been mixed cold in known manner.

The additions mentioned improve the concrete and its adhesion to the reinforcing irons and provide better equalisation of stresses, i.e. improve the concrete in  
75 the direction desirable for the particular application.

The differently coloured batches of the concrete mass produced in the manner described are poured or rammed into prepared shuttering, the erection being straightforward if the mass is multi-coloured in a uniform design. But if the colour of the structure is to vary according to the varying colours in some particular camouflage design, the walls or  
80 roofs are made by introducing the variously coloured concrete masses in zig-zag or saw tooth fashion, over the whole width of the walls, the boundary zones becoming mixed in part to produce the very desirable intermerging effect of the camouflage colours, particularly if the walls are erected by ramming. After the removal of the shuttering the visible surfaces of the structure are of a multi-colour  
85 or variegated appearance, i.e. of the same appearance as structures or vehicles provided with an outer camouflage paint coating.  
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For introducing concrete masses of different colouring for the purpose of producing a bullet proof covering for the building structure, sheet metal moulds are used, a mould being placed for each  
105 colour, the height of the mould being in accordance with the height of the ramming in each case. The moulds are filled respectively with the variously coloured concrete masses, are removed vertically  
110 after the filling is completed and the mass is uniformly rammed down. This process is repeated until the desired thickness of covering is obtained.

In this manner a building structure  
115 consisting of coloured concrete mass is produced, wherein the broken surfaces of the concrete arising from destruction always show the same camouflage colours. Owing to its particular composition as set  
120 forth above in detail, the concrete mass is water repellent, has a high tensile and compression strength, high attrition strength and considerable resistance against chemical influences. The completely closed elastic surface is heat retaining, sound insulating and stress equalising and the adhesion of the concrete to the iron is greater than that of the known concrete masses.  
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Having now particularly described and ascertained the nature of our said invention; and in what manner the same is to be performed, we declare that what we claim is:—

- 5 1. For the purpose of camouflaging outer walls, roofs, roads and the like constructing the same as concrete masses having a variegated appearance produced  
10 by filling the shuttering or other mould with separate batches of differently coloured concrete cast together to form an integral mass with variegations extending throughout its entire thickness.  
15 2. Method of producing concrete masses to be employed according to Claim 1, characterised in that the concrete masses are camouflage-coloured by the addition

of coloured stone powder.

3. Method of producing concrete masses 20 to be employed according to Claims 1 or 2 in camouflage colours, characterised in that the water for mixing the concrete has added thereto alum, permanganate of potash or salts equivalent to these sub- 25 stances.

4. Method of producing concrete masses to be employed according to Claims 1, 2 or 3, characterised in that in addition to the usual filling substances brick powder 30 or suitably coloured mineral fibrous substances are added to the concrete mass.

Dated this 22nd day of November, 1938.

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